

# VMS SUMSLP Utility Manual

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SUMSLP is a batch-oriented editor that allows multiple update files to be applied to a single input file.

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# Preface

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## Intended Audience

This manual is intended for all users familiar with VMS system concepts who want to modify or update input source files.

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## Document Structure

This document consists of the following four sections:

- **Description**—Provides a full description of the SUMSLP Utility (SUMSLP).
- **Usage Summary**—Outlines the following SUMSLP information:
  - Invoking the utility
  - Directing output
- **Qualifiers**—Describes SUMSLP qualifiers and positional qualifier, including format, parameters, and examples.
- **Examples**—Provides additional SUMSLP examples.

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## Associated Documents

The following manuals provide additional information:

- *Guide to Using VMS Command Procedures*
- *VMS DCL Dictionary*
- *VMS System Messages and Recovery Procedures Reference Manual*
- *Guide to Maintaining a VMS System*

## Preface

### Conventions

Convention	Meaning
<b>RET</b>	In examples, a key name (usually abbreviated) shown within a box indicates that you press a key on the keyboard; in text, a key name is not enclosed in a box. In this example, the key is the RETURN key. (Note that the RETURN key is not usually shown in syntax statements or in all examples; however, assume that you must press the RETURN key after entering a command or responding to a prompt.)
<b>CTRL/C</b>	A key combination, shown in uppercase with a slash separating two key names, indicates that you hold down the first key while you press the second key. For example, the key combination CTRL/C indicates that you hold down the key labeled CTRL while you press the key labeled C. In examples, a key combination is enclosed in a box.
<b>\$ SHOW TIME</b> 05-JUN-1988 11:55:22	In examples, system output (what the system displays) is shown in black. User input (what you enter) is shown in red.
<b>\$ TYPE MYFILE.DAT</b> .	In examples, a vertical series of periods, or ellipsis, means either that not all the data that the system would display in response to a command is shown or that not all the data a user would enter is shown.
input-file, ...	In examples, a horizontal ellipsis indicates that additional parameters, values, or other information can be entered, that preceding items can be repeated one or more times, or that optional arguments in a statement have been omitted.
[logical-name]	Brackets indicate that the enclosed item is optional. (Brackets are not, however, optional in the syntax of a directory name in a file specification or in the syntax of a substring specification in an assignment statement.)
quotation marks apostrophes	The term quotation marks is used to refer to double quotation marks ("). The term apostrophe (') is used to refer to a single quotation mark.



---

# SUMSLP Description

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## 1 SUMSLP Utility

The SUMSLP Utility (SUMSLP) is a batch-oriented editor that allows you to update source files. You enter text changes and editing commands in update files. SUMSLP merges the update files containing the changes with the source file that you specify and gives you a record of the changes in the form of an audit trail.

SUMSLP produces a new copy of the input source file containing the additions and changes that you specified in the SUMSLP update files.

## 2 SUMSLP Files

SUMSLP requires two types of input files: an input source file and a SUMSLP update file. These files are described in Sections 2.1 and 2.2.

SUMSLP produces an output file, described in Section 2.3, which is the permanently updated copy of the input file. It includes the changes SUMSLP makes to the input file.

You can generate a listing file, which contains the original lines, the inserted lines, and an audit trail. See Section 2.4 for a complete description.

Figure SUM-1 shows the relationships of the SUMSLP input and output files. The files are described in the following sections.

### 2.1 The Input Source File

The input source file is the file you want to update. The source file must contain less than 32,768 lines.

Because SUMSLP uses line numbers (locators) to determine where to place the changes in your source file, include the numbers of the lines you want to change in the editing commands of your update files. Use the /LISTING qualifier, which gives a numbered listing of your source file, to determine the line numbers that you want to update. See the Qualifiers Section for more information about /LISTING.

### 2.2 The SUMSLP Update File

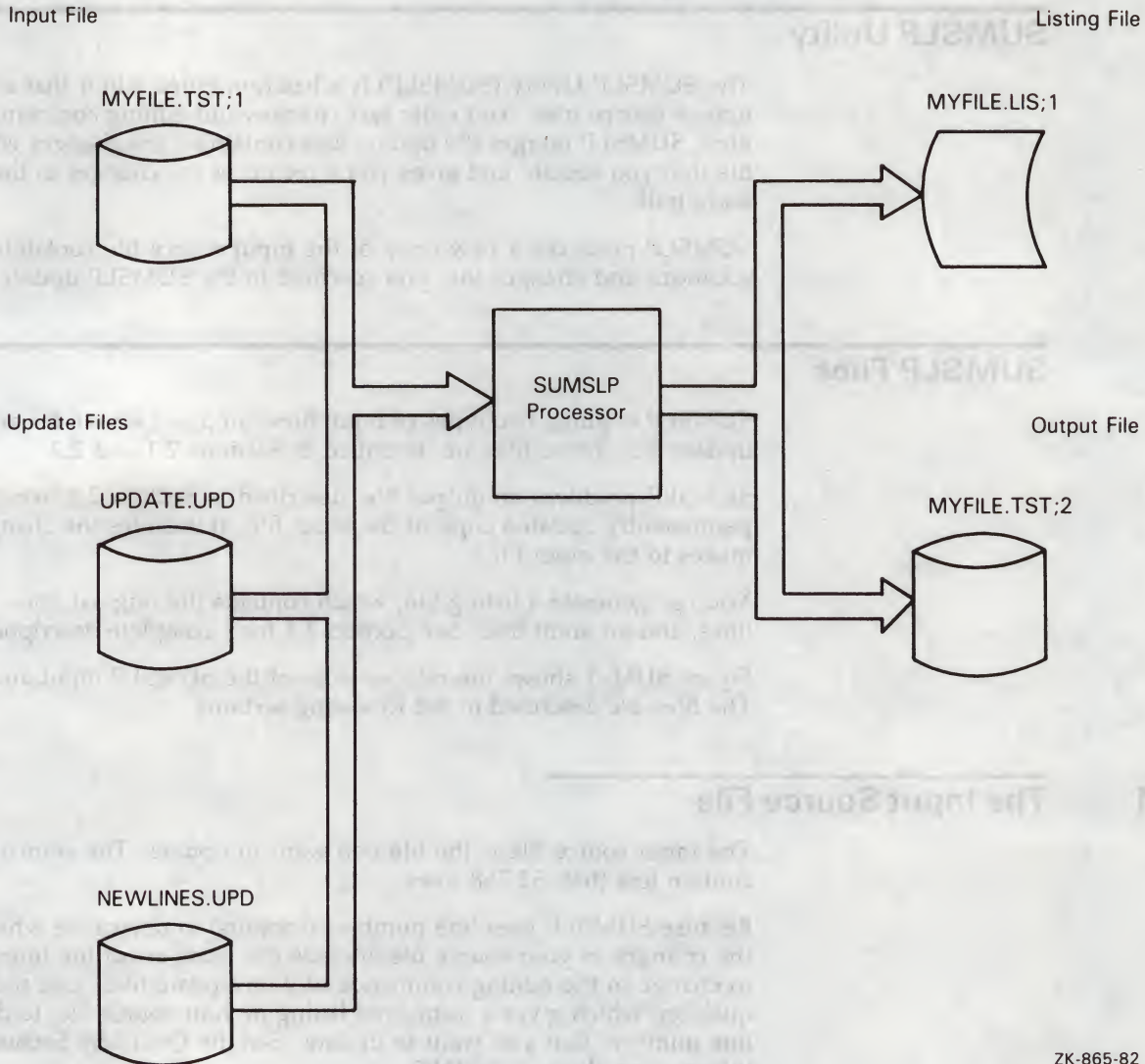
The SUMSLP update file contains input lines with the changes you want to make, and edit command lines that perform the update procedure. You can create as many update files as you want. The following steps describe how to create an update file:

- 1 Using an interactive text editor, create an update file that contains the following elements:
  - a. SUMSLP editing commands that list changes to the input file.



# SUMSLP Description

**Figure SUM-1 Files Used During SUMSLP Processing**



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b. Input lines of text to be added to the source file, either as additional lines or to replace old lines. Use SUMSLP operators, described in Section 3.1, to perform these functions.

c. The SUMSLP terminator, a single slash (/) in column 1, which causes SUMSLP to begin its processing (updating) of the file.

2 Enter the EDIT/SUM command, as shown below, to invoke SUMSLP and to indicate which files you want to update:

```
$ EDIT/SUM input-file/UPDATE=update-file-spec
```



The previous command line is described in the Format section.

**Note:** SUMSLP has a line limit of 32,767 lines. Do not use large SUMSLP update files produced by the DIFFERENCES/SLP DCL command.

## 2.3 The Output File

The SUMSLP output file contains the input source file updated by the additions and changes specified in the SUMSLP command files. It does not include an audit trail or line numbers.

If you do not include a file specification for the output file with the /OUTPUT qualifier in the EDIT/SUM command, the output file takes the same file name as the input source file, with a new version number.

## 2.4 The Listing File

The SUMSLP listing file, which displays original lines, inserted lines, and an audit trail, is produced if you specify the /LISTING qualifier in the EDIT/SUM command. If you do not specify another name for it, it takes the same file name as the input source file, with the default file type of LIS.

## 3 Specifying SUMSLP Editing Commands

Use SUMSLP editing commands to update source files by adding, deleting, and replacing lines in a file. These commands include characters that SUMSLP interprets as operators. This section describes these operators and the general form for specifying SUMSLP editing commands. It then describes specific editing commands.

### 3.1 SUMSLP Operators

When SUMSLP encounters any of the characters listed in Table SUM-1 as the first character in an input line, it interprets the character as an operator.

**Table SUM-1 SUMSLP Operators**

Operator	Meaning
- (minus sign)	Must appear as the first character of a SUMSLP editing command
\ (backslash)	Suppresses audit trail generation
% (percent sign)	Enables audit trail generation
/ (slash)	Terminates the editing session
< (less-than character)	Escape character

The percent sign ( %) operator enables audit trail generation after generation has been suppressed by the backslash ( \ ) operator.



# SUMSLP Description

The less-than ( < ) operator enables the use of SUMSLP operators (including <) as standard characters. For example, if you enter </ (in columns 1 and 2), the slash is interpreted as a character, and your editing session is not terminated.

## 3.2 Editing Command Format

The format of a SUMSLP editing command is as follows:

```
-locator1,locator2,/audttrail/;comment  
inputline
```

All fields in the command line are position-dependent; commas must be included to separate fields. Commas must also be included for omitted fields.

### Command Parameters

#### - (minus sign)

A minus-sign operator indicates that this is a SUMSLP editing command line.

#### locator1

A line locator that causes SUMSLP to move the current line pointer to a line you specify. If you specify only one locator (locator1), the current line pointer is moved to that line, and SUMSLP reads the next line in the editing command file. Used with locator2, locator1 defines the beginning of a range of lines.

#### locator2

A line locator that defines the end of a range of lines, beginning with locator1, to be deleted or replaced. Locator1 and locator2 fields can be specified using either of the following locator forms:

**[ number ]**

#### number

A number in the range of 1 through 32767 to which the current line pointer is moved.

#### . (period)

A period represents the current line. The following example shows how to delete a single line (line 2) using the period locator:

```
-2,.  
/
```

Both forms of the line locator can be specified in a command line.

SUMSLP edits files sequentially. Once the line pointer moves past a given line in the file, it cannot be returned to that line.



**/audittrail/**

A character string that marks new or replaced lines in the file. This argument must be delimited by slashes (/). If you do not include two locator fields in the editing command, precede the audit trail specification with two commas, as shown in the following example:

```
-5, ,/;**08-JUN**/
```

Usually the first character of the audit trail is set to match the comment delimiter of the source file being edited (for example, a semicolon (;) as shown above). Thus, the audit trail string is ignored when the source file is compiled or assembled because the audit trail begins with the comment delimiter.

An audit trail is produced automatically until either changed or suppressed by using the backslash (\) character, as shown in the following example:

```
-4, ,\
```

The default audit trail for each line added is **;\*\*NEW\*\***.

To indicate the total number of lines deleted or replaced, the listing file contains a marker. The marker is placed on the first unchanged line following a deletion or replacement and has the form **-n**, where **n** is the number of lines deleted or replaced. In the following example, **-5** indicates that 5 lines were deleted:

```

                                4 KLM
-5                                10 987

```

**;comment**

An optional comment. SUMSLP ignores any text after a semicolon.

**inputline**

A line of new text that you enter, which is inserted into the file immediately following the current line. You can enter any number of input lines.

**3.2.1****Examples of Editing Commands**

The following example shows the contents of a SUMSLP update file named **MYFILE.UPD**. The file contents are followed by the command line that updates the input source file named **MYFILE.TST**. (Section 2.2 describes update files.)

**MYFILE.UPD** contents:

-3	①
INSERT THIS LINE AFTER LINE 3	②
-4,4	①
DELETE LINE 4 AND REPLACE IT WITH THIS LINE	②
/	③
<b>\$ EDIT/SUM MYFILE.TST/UPDATE=MYFILE.UPD</b>	④

## SUMSLP Description

- ① Editing command
- ② Input line
- ③ Terminator
- ④ Command line

The next example illustrates the generation of a listing file. MYFILE.TST (input source file) contents:

```
ONE  
TWO  
THREE  
FOUR  
FIVE  
SIX  
SEVEN  
EIGHT  
NINE  
TEN
```

In this example, two update files have been created. The first, UPDATE.UPD, contains the following editing commands and text:

```
-3,3,/,;21-MAR/  
INSERTED LINE  
/
```

The second update file, NEWLINES.UPD, contains the following editing commands and text:

```
-7,.,/;22-MAR/  
NEW LINE  
/
```

When the commands in these SUMSLP update files are applied to the input source file, SUMSLP produces the listing file MYFILE.LIS.

The SUMSLP command for this example contains the following file specification and qualifiers:

```
$ EDIT/SUM MYFILE.TST/LISTING/UPDATE=(UPDATE.UPD,NEWLINES.UPD)
```

The listing file, MYFILE.LIS, now contains the following lines:

```
1 ONE  
2 TWO  
;21-MAR 1 INSERTED LINE  
-1 4 FOUR  
5 FIVE  
6 SIX  
7 SEVEN
```



```
;22-MAR .1 NEW LINE
      8 EIGHT
      9 NINE
     10 TEN
```

## 3.3 How SUMSLP Processes Files

SUMSLP applies the edits that you specify in the SUMSLP update files to the source lines of the input source file. When a list of update files is specified with the /UPDATE qualifier, the editing commands in the various files are arranged according to the following rules:

- 1 Using the line number pointed to by locator1, SUMSLP applies editing commands sequentially, in ascending order. All edits that do not overlap or conflict with any other edits are applied to the source file without any further processing.
- 2 Conflicting editing commands are resolved according to the precedence of the SUMSLP command file in which the commands occur. Precedence is determined by the position of the file specifications following /UPDATE. The file specification listed last has the highest precedence. In the following example, the edit commands in the CHANGE02.UPD file would have the highest precedence:

```
$ EDIT/SUM MYFILE.TST/UPDATE=(CHANGE01.UPD,CHANGE02.UPD)
```

All inserts to the same source line are included in the output file; those from the SUMSLP update file with the highest precedence appear first.

An operation that deletes or replaces a line affects the specified line and any lower precedence inserts or replacements to the same line. A deletion that specifies a range of lines deletes all lines occurring in that range, including inserted lines from SUMSLP update files of lower precedence.

## 3.4 Adding Lines to a File

The SUMSLP editing command for adding lines to a file, as shown below, contains only one locator field:

```
-locator1,./audittrail/;comment
```

If, in the locator1 field, you specify a line number, SUMSLP inserts new lines after that line number. The new lines, which are taken from the update file, are those text lines that follow the SUMSLP command up to, but not including, the next SUMSLP command line.

Because there is only one locator field, the audit trail specification must be preceded by two commas.

In a SUMSLP listing, a period precedes the line numbers of inserted lines to distinguish them from original lines.



## SUMSLP Description

Inserted line numbers begin with .1 at the start of each series of new lines, as shown in the following excerpt from a listing file.

```

.
.
.
3 THREE
;21-MAR .1 INSERTED LINE
4 FOUR
.
.
```

The following example shows how lines are added to a file. The input source file (MYFILE.TST) consists of the following ten lines:

```

1 ABC
2 DEF
3 GHI
4 KLM
5 123456789
6 456
7 789
8 CBA
9 XYX
10 987
```

The SUMSLP update file (UPDATE.UPD) consists of the following editing commands and lines of text:

```

-5,./;**08-JUN**/
INSERT THIS LINE AFTER LINE 5
/
```

The SUMSLP command line contains the following file specification and qualifiers:

```
$ EDIT/SUM MYFILE.TST/OUTPUT/LISTING=NEWFILE.LIS/UPDATE=UPDATE.UPD
```

The input file is MYFILE.TST. The /OUTPUT qualifier generates an output file with the same name and a higher version number (MYFILE.TST;2). The /LISTING qualifier generates the listing file NEWFILE.LIS;1. The /UPDATE qualifier specifies the file UPDATE.UPD as the update file. NEWFILE.LIS;1 contains the following lines:

```

1 ABC
2 DEF
3 GHI
4 KLM
5 123456789
```



```

; **08-JUN**      .1 INSERT THIS LINE AFTER LINE 5
                   6 456
                   7 789
                   8 CBA
                   9 XYX
                  10 987

```

In the preceding listing example, SUMSLP has applied line numbers and added an audit trail (;\*\*08-JUN\*\*) to the line following line 5.

The next example uses the updated input source file (MYFILE.TST;2) and a new SUMSLP update file (NEWTEXT.UPD) containing the following lines:

```

-4, ,/; **09-JUN**/
THIS IS NEW TEXT
/

```

The command line contains the following file specification and qualifiers:

```
$ EDIT/SUM MYFILE.TST/OUTPUT/LISTING=NEWFILE.LIS/UPDATE=NEWTEXT.UPD
```

SUMSLP processing generates the output file MYFILE.TST;3 and the listing file NEWFILE.LIS;2. NEWFILE.LIS;2 contains the following lines:

```

                   1 ABC
                   2 DEF
                   3 GHI
                   4 KLM
; **09-JUN**      .1 THIS IS NEW TEXT
                   5 123456789
                   6 INSERT THIS LINE AFTER LINE 5
                   7 456
                   8 789
                   9 CBA
                  10 XYX
                  11 987

```

SUMSLP has numbered the lines in sequence. In this example, the new input line is inserted after line 4.

## 3.5 Deleting Lines from a File

The following SUMSLP editing command for deleting lines from a file contains two locator fields:

```
-locator1,locator2,/audittrail;/comment
```

The first field, locator1, specifies the line where SUMSLP is to begin deleting lines; locator2 specifies the last line to be deleted. SUMSLP deletes all lines from locator1 through locator2, inclusive.

## SUMSLP Description

The following example shows how to delete lines from a file using SUMSLP. The input source file (TESTFILE.TST) consists of the following ten lines:

```
1 ABC
2 DEF
3 GHI
4 KLM
5 123456789
6 456
7 789
8 CBA
9 XYX
10 987
```

The SUMSLP update file (CHANGE01.UPD) contains the following editing commands:

```
-5,9
/
```

The SUMSLP command line contains the following file specification and qualifiers:

```
$ EDIT/SUM TESTFILE.TST/OUTPUT/LISTING=ALPHA.LIS/UPDATE=CHANGE01.UPD
```

SUMSLP processing creates the files TESTFILE.TST;2 and ALPHA.LIS;1. ALPHA.LIS;1 contains the following lines:

```
1 ABC
2 DEF
3 GHI
4 KLM
-5 10 987
```

In this example, SUMSLP first deletes line 5, which is specified by the locator1 entry. It then continues to delete lines until it deletes line 9, which is specified by the locator2 entry.

Using the original input source file from the example above, the next example shows how to delete a single line using the period locator. The new update file (CHANGE02.UPD) contains the following lines:

```
-2,.
/
```

The SUMSLP command line contains the following file specification and qualifiers:

```
$ EDIT/SUM TESTFILE.TST/OUTPUT/LISTING/UPDATE=CHANGE02.UPD
```



SUMSLP processing creates the files TESTFILE.TST;2 and TESTFILE.LIS;1. TESTFILE.LIS;1 contains the following lines:

```

-1      1 ABC
        3 GHI
        4 KLM
        5 123456789
        6 456
        7 789
        8 CBA
        9 XYX
       10 987
  
```

SUMSLP moves the current line pointer to line 2 and then finds the period as the second locator field. Since the second locator field is specified, SUMSLP interprets the editing command as a delete operation and deletes the line containing DEF.

## 3.6 Replacing Lines in a File

A replacement is a deletion followed by the insertion of new text. The number of lines deleted does not need to match the number of lines added. To replace lines in a file, use the two-locator command form. The first line locator field specifies the first line to be deleted. The second line locator field specifies the last line in the range to be deleted, which, for replacement operations, is the line where new text is to be inserted.

The example below shows how to delete lines from a file and replace them with new lines. The input source file (SOURCE.TST) consists of the following seven lines:

```

1  ABC
2  DEF
3  GHI
4  123456789
5  BCN
6  CRB
7  BUR
  
```

The SUMSLP update file (REPLACE.UPD) contains the following editing command and text lines:

```

-2,3,/,**LINE*REPLACED**/
XXXXXX
YYYYYY
ZZZZZZ
/
  
```

The SUMSLP command line contains the following file specification and qualifiers:

```
$ EDIT/SUM SOURCE.TST/LISTING/OUTPUT/UPDATE=REPLACE.UPD
```



## SUMSLP Description

SUMSLP processing generates the files SOURCE.TST;2 and SOURCE.LIS;1. SOURCE.LIS contains the following lines:

```
1 ABC
;*.LINE*REPLACED*.1 XXXXXX
;*.LINE*REPLACED*.2 YYYYYY
;*.LINE*REPLACED*.3 ZZZZZZ
-2 4 123456789
5 BCN
6 CRB
7 BUR
```

### 3.7 Changing the Audit Trail Text

The following SUMSLP edit command changes the text of the audit trail:

```
-,./newtrail/
```

Here, newtrail is the new text of the audit trail. All subsequent lines added will include the new audit trail text.

When you create a new audit trail, you may want to set the first character of the string to correspond to the source files's comment delimiter so that the audit trail string is ignored when the source file is compiled or assembled.

## 4 Running SUMSLP from a Command File

If you find that you are often using the same command line and editing commands, you might want to create a command file that contains all the commands. To run SUMSLP from a command file, create a file that contains the required SUMSLP editing commands, input lines, and the SUMSLP terminator (/) in the first column of the last line.

The following is an example of a command file named UPDATE.COM:

```
$ EDIT/SUM MYFILE.TST/UPDATE=SYS$INPUT
-3
INSERT THIS LINE AFTER LINE 3
-4,4
DELETE LINE 4 AND REPLACE IT WITH THIS LINE
/
```

Execute UPDATE.COM by using the Execute Procedure (@) command, as follows:

```
$ @UPDATE
```

Because the file type is the default file type COM, omit it from the DCL command line. (See the *Guide to Using VMS Command Procedures* handbook for information on using command procedures and running batch jobs.) When SUMSLP finishes its processing, the DCL prompt is issued.



SUM-13

---

## SUMSLP Usage Summary

The SUMSLP Utility is a batch-oriented editor that allows you to update source files. You enter text changes and editing commands in update files. SUMSLP merges the update files containing the changes with the source file that you specify and gives you a record of the changes in the form of an audit trail. SUMSLP produces a new copy of the input source file containing the additions and changes that you specified in the SUMSLP update files.

---

<b>FORMAT</b>	<b>EDIT/SUM</b> <i>input-file</i>
---------------	-----------------------------------

---

<b>COMMAND PARAMETER</b>	<b><i>input-file</i></b> The file specification for the source file to be edited.
------------------------------	--

---

<b>usage summary</b>	SUMSLP can be run either indirectly from a command procedure or interactively from your terminal. To invoke SUMSLP interactively, enter the following DCL command:
----------------------	--

**EDIT/SUM** *input-file*

To invoke SUMSLP from a command procedure, precede the command with a dollar sign (\$).

You can update source files using SUMSLP editing commands, which allow you to add, delete, or replace lines in a file (see Section 3). There are no privileges or restrictions in running SUMSLP.



## SUMSLP QUALIFIERS

SUMSLP qualifiers control the generation and format of the listing file and the output file. Use them to control the output options associated with these files. The following sections illustrate the use of SUMSLP qualifiers.

## SUMSLP

### /LISTING

---

## /LISTING

Controls whether a sequence-numbered listing file showing the original and inserted lines and an audit trail is produced during the editing process.

---

**FORMAT**            **/[NO]LISTING[=*file-spec*]**

---

**PARAMETERS**    ***file-spec***  
The file specification of the listing file.

---

**DESCRIPTION**    If you do not include a file specification, the listing file takes the same name as the input file with a default file type of LIS. The default is /NOLISTING. The listing file is described in Section 2.4.  
  
/LISTING is a command qualifier only.



---

## /OUTPUT

Specifies the output file to be created in the editing operation.

---

**FORMAT**            **/[NO]OUTPUT[=*file-spec*]**

---

**PARAMETERS**    ***file-spec***

The file specification of the output file.

---

**DESCRIPTION**

If you do not specify /OUTPUT or omit the file specification, the output file has the same name and type as the input file with a new version number. The output file is described in Section 2.3.

/OUTPUT is a command qualifier only.

# SUMSLP

## /HEADER

---

## /HEADER

Controls whether the output file is created as a sequential file of variable length records in fixed-length control (VFC) format with the line insert number and audit trail information in the record header block (RHB).

---

**FORMAT**      */[NO]HEADER/OUTPUT=file-spec*

---

**PARAMETERS**    */OUTPUT=file-spec*  
The file specification of the output file.

---

**DESCRIPTION**    The default is /NOHEADER.



## SUMSLP POSITIONAL QUALIFIER

The SUMSLP positional qualifier /UPDATE controls the selection of the update file or files. The following section describes the use of /UPDATE.

FORMAT	UPDATE=update (file name)
PARAMETERS	update file-spec
DESCRIPTION	<p>The update file-spec is a file name or a file name with a file extension. It is used to specify the update file or files to be used for the update operation.</p> <p>If the update file-spec is a file name with a file extension, the update operation will use the file specified by the update file-spec. If the update file-spec is a file name without a file extension, the update operation will use the file specified by the update file-spec with the default file extension.</p> <p>If the update file-spec is a file name with a file extension, the update operation will use the file specified by the update file-spec. If the update file-spec is a file name without a file extension, the update operation will use the file specified by the update file-spec with the default file extension.</p> <p>If the update file-spec is a file name with a file extension, the update operation will use the file specified by the update file-spec. If the update file-spec is a file name without a file extension, the update operation will use the file specified by the update file-spec with the default file extension.</p>

# SUMSLP

## /UPDATE

---

### /UPDATE

Indicates the file or files containing the editing commands and changes to be applied to the input source file.

---

#### FORMAT

**/UPDATE**[(*update-file-spec*[,...])]

---

#### PARAMETERS

***update-file-spec*[,...]**

The file or files containing the editing commands and changes to be applied to the input source file.

---

#### DESCRIPTION

If multiple file specifications are listed, separate them with commas, and enclose the list in parentheses. Section 3.3 describes SUMSLP processing of multiple update files. The default file type of these files is UPD. Default values for the other elements of the file specification are initially taken from the input file specification; after the first file specification in a list, values default to those of the immediately preceding file specification.

If no file specification or list of file specifications is given, SUMSLP attempts to open a single update file with the same file name as the input file and a file type of UPD.

If you do not include the /UPDATE qualifier in the command line, SUMSLP does not search for an update file. It generates the specified output or listing file with no changes applied. Enter the EDIT/SUM command with the /LISTING qualifier, but without the /UPDATE qualifier, to generate a numbered listing of your source program.

**Note:** SUMSLP has a line limit of 32,767 lines. Do not use large SUMSLP update files produced by the DIFFERENCES/SLP DCL command.

/UPDATE is a file qualifier only.



---

**SUMSLP**  
**EXAMPLES**

**1**    \$ EDIT/SUM    FILE1.MAR/UPDATE

In Example 1, the input source file FILE1.MAR is updated with the SUMSLP update file FILE1.UPD.

**2**    \$ EDIT/SUM    FILE2.MAR/UPDATE=UPD2

In Example 2, the input source file FILE2.MAR is updated with the SUMSLP update file UPD2.UPD because UPD is the default file type.

**3**    \$ EDIT/SUM    FILE3.MAR/UPDATE=(UPD3A,UPD3B.ENH,UPD3C)

In Example 3, the input source file FILE3.MAR is updated with the merged contents of SUMSLP update files UPD3A.UPD, UPD3B.ENH, and UPD3C.ENH.

SUMSLP  
EXAMPLES

EXAMPLE 1: The first example is a simple case of a function of two variables,  $f(x, y)$ , defined on the domain  $D = [0, 1] \times [0, 1]$ . The function is defined by the formula  $f(x, y) = x^2 + y^2$ .

EXAMPLE 2: The second example is a function of three variables,  $f(x, y, z)$ , defined on the domain  $D = [0, 1] \times [0, 1] \times [0, 1]$ . The function is defined by the formula  $f(x, y, z) = x^2 + y^2 + z^2$ .

EXAMPLE 3: The third example is a function of four variables,  $f(x, y, z, w)$ , defined on the domain  $D = [0, 1] \times [0, 1] \times [0, 1] \times [0, 1]$ . The function is defined by the formula  $f(x, y, z, w) = x^2 + y^2 + z^2 + w^2$ .

EXAMPLE 4



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# NOTES



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# NOTES



NOTES

# NOTES



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